UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/896,689	06/29/2001	Robert Jacques	ACX-135	8713

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EXAMINER
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ART UNIT	PAPER NUMBER
2121	

DATE MAILED: 07/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>19 April 2005</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-64</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) <u>21 and 53-58</u> is/are allowed.

6)☒ Claim(s) <u>1-20, 22-52 and 59-64</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   Claim 10 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

As per claim 10, claim 1 already adequately sets forth the data acquisition occurring in response to a predefined event, and therefore, claim 10 does not further limit claim 1.

As per claims 18, 22, 33, 46, 47, 48, 49, 50, 51 and 52, "fully coupled" is not adequately described so that one of ordinary skill in the art would know what is meant. It has been assumed that this feature merely represents that the complex control system is adequately modeled so that all aspects of the system are taken into account when determining the initial; model, a feature that is believed to be inherent to any adaptive control system and therefore this feature has been given little patentable weight.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-18, 32, 45 and 49 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As per claims 1, 18, 32, 45, 49, a sensor element located _on_ the apparatus is not a feature that was described in the specification, including the claims, as originally filed, and therefore appears to constitute new matter. "in proximity to the apparatus" is the only distinction provided with respect to the location of the sensor, and it is this interpretation that the examiner will use will formulating any art rejections set forth below in this office action.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 7, 11-16, 19-20, 31-32, 34, 38-41 and 62-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Junk, U.S. Patent No. 6,128,541, in view of Zou et al., U.S. Patent No. 5,691,896, in further view of Graham et al., U.S. Patent No. 5,144,595.

As per claim 1, Junk teaches a system for controlling the physical behavior of an apparatus, the behavior of the apparatus estimated by an initial behavioral model (i.e. C6 L41-48), the system comprising:

-       a sensor element for acquiring data which accurately characterizes the physical behavior of a machine component indicative of the physical behavior of the apparatus (e.g. using what is known as a system identification procedure, for generating an initial model of the system, wherein induced controlled oscillations are supplied into the system so that their responses may be measured; C1 L26-40) ;

-       a system processor which includes a tunable controller based on the initial behavior model, the processor being capable of generating a drive signal, estimating a behavioral model, tuning and adjusting the controller and

generating a control signal, wherein the processor adapts the initial model to an
updated model based upon the acquired data to create a relation that describes
the behavior of the apparatus and creates a controller based on the relation such
that the controller is tuned according to the updated model, and wherein the
control signal generated by the processor according to the controller is used to
control the physical behavior of the apparatus (e.g. Abstract, Figure 2, C1 L26-
51, C2 L48-50 and C3 L9-13).

As per claims 1 and 11, Junk does not specifically teach the disclosed
auto-tuner data measuring occurring during an abnormal period triggered by an
event or the measured data being indicative of the behavior of the machine
component when in normal use.

Zou et al. teaches the use of a trigger circuit for use in a auto-tuning
control system, wherein a tuning procedure is initiated by the actions of the
trigger circuit (e.g. Figure 3 element 134 and C6 L17-62).

It would have been obvious to one of ordinary skill in the art at the time the
invention was made to have incorporated the teachings of Zao et al into the
disclosed system contemplated by Junk for the purpose of allowing a way for the
tuning to be-preempted, or started, whether it be at the discretion of the operator
or based on a predetermined amount of time, using a real time clock (e.g. Figure
3 element 138), and this would have been obvious to one of ordinary skill in the
art at the time the invention was made.

As per claim 1, although not specifically stated, having a sensor as close
as possible to the valve, or "in proximity to the apparatus", it is a feature that
would have been obvious to one of ordinary skill in the art at the time the
invention was made because the more length a signal has to travel, the more
noise or disturbance, may be associated with that signal, therefore the signal
may degrade, which will not give a very accurate reflection as to the current state
of the system, thereby resulting in poor system identification. Therefore, a sensor

would obviously be placed as close as possible to that which is being measured, and this would have been obvious to one of ordinary skill in the art a the time the invention was made.

As per claim 1, Junk's combined system (Junk in view of Zou) does not specifically teach the use of an adaptive, or universal, type filtering means.

That is, as presented "universal" can only be viewed to be the equivalent of a filter, which has many uses, as is the case with an adaptive filter. Since claim 12 does not provide any further definition as to what is meant by universal, the examiner has interpreted universal to broadly equate to adaptive, since as already mentioned, a filter which adapts is a filter which may be viewed to be universally applicable.

Graham et al. discloses a filtering means (e.g. an optimal filter) for use in an adaptive control system, for improving performance for target motion analysis · noise discrimination (e.g. Abstract and C1 L41 – C2 L21).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Graham et al into Junks combined system for the purpose of allowing an adaptive means for dealing with inherent noise in any control system, thereby increasing the effectiveness and reliability of the actual control system by providing for proper filtering of all measured signals, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

As per claim 2, Junk teaches producing a drive signal (e.g. Figure 1 element "u").

As per claim 3, Junk teaches the solving of an optimal control problem (e.g. utilizing the system for determining proper gain adjustments for the control system using a performance index, Figure 2).

As per claim 4, Junk teaches the use of Linear Quadratic Gaussian (e.g. C1 L62 – C2 L7).

As per claim 7, Junk teaches the use of a digital signal processor since this feature is inherent to a processor used in a typical computer system (e.g. C3 L9-13).

As per claim 12, Junk teaches the use of an actuator for use in controlling the system (e.g. Figure 2 element 40).

As per claim 13, Junk teaches the use of transfer function blocks (e.g. Figure 2 elements 50, 52, 54 and 56).

As per claim 14, Junk teaches the use of gathering frequency data (e.g. C1 L26-40).

As per claims 15 and 16, Junk teaches the use of a signal conditioner (e.g. Figure 2 element 36) and an amplifier (e.g. Figure 2 element 48).

As per claims 19 and 62, Junk teaches non-linear curve fitting (e.g. C1 L35-40).

As per claims 20 and 63, Junk teaches the use of an error function (e.g. Figure 2, output from element 46).

As per claims 31-32, 34 and 38-39, the rejection of claim 1 is equally applied herein.

As per claims 40-41, Junk teaches the controller values as being representative of controller gains (e.g. Figure 2 elements k1-k5).

4.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Junk, U.S. Patent No. 6,128,541, in view of Zou et al., U.S. Patent No. 5,691,896, in further view of Graham et al., U.S. Patent No. 5,144,595, as applied to claim 1 above, and in further view of Plummer, U.S. Patent No. 5,268,625.

        As per claim 5, Junk's combined system does not teach a user defined universal filter.

        Plummer teaches a user defined demand filter which is used for adaptively controlling a servo system (e.g. Abstract and C4 L26-34).

        It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Plummer into Junk's combined system for the purpose of allowing the operator to independently determine what values the demand filter, or the adaptive filter should take, thereby providing increased flexibility to the adaptive control system by allowing an experienced operator the ability to change filter values as desired, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

5.   Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Junk, U.S. Patent No. 6,128,541, in view of Zou et al., U.S. Patent No. 5,691,896, in further view of Graham et al., U.S. Patent No. 5,144,595, as applied to claim 1 above, and in further view of Official Notice.

        Official Notice is taken with respect to a laptop, or portable type computer, in communication with a control system. This system is well known in the art and is useful for allowing remote configuration and or operations/ diagnosis for a control system, and this would have been obvious to one of ordinary skill in the art at the time the invention was made.

6.   Claims 17-18, 22-24, 33, 46 and 49 are rejected as being unpatentable
over Junk, U.S. Patent No. 6,128,541, in view of Zou et al., U.S. Patent No.
5,691,896, in further view of Graham et al., U.S. Patent No. 5,144,595, as
applied to claim 1 above, and in further view of de Ward et al., U.S. Patent No.
6,207,936.

        As per claims 17-18, 22-24, 33, 46 and 49, Junk's combined system does
not teach a multivariate controlled system utilizing a model of minimal order.
        De Ward teaches a model of minimal order (e.g. C22 L25-63).
        It would have been obvious to one of ordinary skill in the art at the time the
invention was made to have included a feature of using a model of minimal order
so that the amount of data to be processed is lessened, thereby improving
flexibility, robustness and speed of the model based controller, and this would
have been obvious to one of ordinary skill in the art at the time the invention was
made.

        As per claim 23, Junk teaches the use of Linear Quadratic Gaussian (e.g.
C1 L62 – C2 L7).

        As per claim 24, at least one parameter for controlling the behavior of the
system is inherent to Junk (e.g. "gain).

7.   As per method claims 25, 26-29, 30, 35, 36, 37, 42-44, 47-48 and 50-52,
the rejection of at least system claims 1, 17-18 and 22 is applied equally herein.
The method claims merely reproduce the specific steps already contemplated by
the rejection of at least claims 1, 17-18 and 22, set forth above in this office
action. In addition, any features not covered by the rejection of the
aforementioned claims are believed to be inherent to the adaptive control system
contemplated by Junks' combined system.

It is noted that if the applicant decides to assert that the methods are not, as the examiner has alleged, taught by the system claims, that the applicant may be admitting that a Restriction may be proper since, as quoting the MPEP, "inventions are distinct if it can be shown that either: (1) the process (method) as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)).

As per claims 27-28, the rejections of claims 14 and 19 are equally applied herein.

As per claims 43-44, the rejection of claims 40-41 is applied equally herein.

Allowable Subject Matter

8.   Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As per claim 6, the prior art of record fails to specifically teach the claimed universal filter, as described in the equation of claim 6, in combination with the other claimed limitations or features as claimed.

Claims 21 and 64 are objected to as being dependent upon a rejected base claim; but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As per claim 21, the prior art of record fails to specifically teach the claimed equation for computing logarithmic error, as described in the equation of claim 21, in combination with the other claimed limitations or features as claimed.

Claims 45, 53-58 and 60-61 are allowable, if re-written to overcome the outstanding 112 1st issues, as mentioned above.

As per claim 45, the prior art of record fails to teach an adaptive control system utilizing a universal filter being described by the equation as set forth in claim 45, in combination with the other claimed features.

Claims 60-61 are allowable as they depend from allowed base claim 45.

Response to Arguments

9.   Applicant's arguments with respect to claims 1-64 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ronald D Hartman Jr. whose telephone number is 703-308-7001, and after October 12, 2004, (571) 272 - 3684. The examiner can normally be reached on Mon. - Fri., 11:30 am - 8:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 703-308-3179, and starting October 12, 2004, at (571) 272 - 3687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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